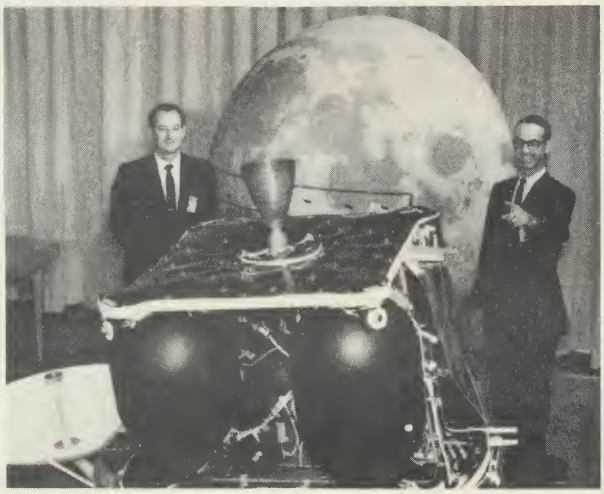
BULLETIN NEWS

5:00 AM PDT SUNDAY, 21 AUGUST 1966

MARQUARDT ENGINE ORBITS THE MOON



11 DAYS AND 700,000 MILES TRAVELED IN SPACE TO DATE

RECORDS SET

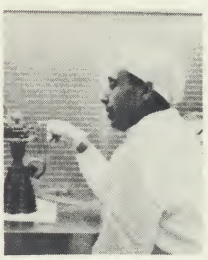
- FIRST IN CONTROLLED ORBIT AROUND MOON OR PLANETS
- LONGEST PROGRAMMED IN-SPACE BURN TIME - BOTH SINGLE AND ACCUMULATED BURNS

WHAT OUR CUSTOMERS THINK

"We expected the engine to perform well."
Dr. Jack Queljo, NASA Langley Space Analysis Branch

"Your engine performed perfectly."
George Hage, Chief Engineer, L. O. Boeing

"The engine scored a bullseye." Dave Carter, NASA Langley Velocity Control Subsystem



"Flight performance was exactly as predicted from ground tests."
Bill Kann, Velocity Control Subsystems, Boeing

THE MARQUARDT CORPORATION

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12 SEPTEMBER 1966

LUNAR ORBITER VELOCITY CONTROL ENGINE

FLIGHT SUMMARY

Marquardt's Model R-4D 100 pound thrust rocket engine on NASA's Lunar Orbiter I Vehicle has completed its primary mission of placing the vehicle in a precise orbit around the moon and adjusting that orbit for close-up photographs of potential Apollo landing sites. To date, a total of four engine firings, a record in-space burn time of 636.3 seconds, and a one-month period in-space without engine valve seal leakage, have been accumulated. The firings are summarized below.

Date	Time PDT	Event	Burn Time (seconds)	Result
10 August	1226	Launch	--	Successful
11 August	1700	Midcourse Correction	32.1	ΔV = 124 ft/sec successful. No second midcourse required.
14 August	0835	Deboost to Lunar Orbit	578.7	ΔV = 2592 ft/sec Apolune - 1160 Miles (Planned 1150 Miles) Perilune - 119 Miles (Planned 125 Miles)
21 August	0242	Transfer to Low Photo Orbit	22.5	ΔV = 132 ft/sec Perilune 36 Miles as Planned
25 August	0901	Adjust Orbit to Lower Perilune	3.0	ΔV = 18 ft/sec Perilune 25 Miles as Planned

The accurate orbit control achieved was largely due to very accurate pre-flight prediction of engine flight performance based upon ground test results obtained at Marquardt altitude test facilities.

To date, Model R-4D rocket engines have made three successful space flights. In both February 1966 and August 1966, sixteen each of the engines were successfully flown on the Unmanned Apollo - Saturn sub-orbital flights. In these flights, the engines performed the Apollo Service Module vehicle maneuver functions of separation, stabilization, spacecraft rotation, and propellant settling. Sixteen of the engines will also be used on Apollo's Lunar Module. The Apollo Service Module and Lunar Module applications require many thousands of in-space ignitions and precise millisecond thrust pulses (impulse bits). The Lunar Orbiter mission requires long steady state burn time operation. These contrasting space application requirements illustrate the operational flexibility of the Marquardt Model R-4D rocket engine.